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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,694	12/28/2005	Alexander Giles Davies	35-05	9002

23713 7590 04/26/2010

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EXAMINER	
VAN, LUAN V	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
04/26/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/530,694	DAVIES ET AL.	
	Examiner	Art Unit	
	LUAN V. VAN	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 April 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 6, 2010 has been entered.

Response to Amendment

Applicant's amendment of April 6, 2010 does not render the application allowable. Claims 1-13 are pending in the application.

Status of Objections and Rejections

All rejections from the previous office action are maintained.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-6, 10, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tender et al. (*Electrochemical Patterning of the Self-Assembled Monolayers onto Microscopic Arrays of Gold Electrodes Fabricated by Laser Ablation*, **Langmuir**, 1996, 12, 5515-5518, cited in the IDS).

Regarding claim 1, Tender et al. teaches a method of forming coatings of at least two different coating molecules on at least two electrodes, the method comprising: (a) providing an array of at least two individually-addressable electrodes (i.e., electrodes A, Fig. 2), (b) allowing a layer of a masking molecule to adsorb onto all electrodes (i.e., immersing the substrate in ethanolic EG6S, page 5517, left column, first full paragraph); (c) inducing electrochemical desorption of the masking molecule from at least one but not all electrodes to expose a first set of exposed electrodes (i.e. desorption of EG6S from the electrode A, page 5517, left column, first full paragraph), and (d) allowing a first coating molecule to adsorb onto the first set of exposed electrodes (i.e., immersing the electrodes in C16S, page 5517, left column, first full paragraph).

Tender et al. further teaches that the process is repeated to form more than two different monolayers as follows:

> It is important to note that the extension of this technique to patterning more than two different monolayers (say n) should be straightforward. After microfabricating an array of n individually-addressable microelectrodes, exposure of the entire array to a 0.5 M ethanolic solution of an alkanethiol should result in a SAM of that alkanethiolate only on the first element if the other elements are biased to a sufficiently reductive potential or have been previously modified with another SAM. Then, by sequentially releasing potential control of the elements as the array is exposed to 0.5 M ethanolic solutions of different alkanethiols, it should be possible to build up a microscopic array consisting of n gold elements modified with SAMs of n different alkanethiolates. (Page 5517, right column, second full paragraph.)

The reductive potential broadly reads on the limitation reciting electrochemical desorption of masking molecule in the subsequent steps. Subsequent deposition of the alkanethiol on the other elements broadly read on the second coating step.

Tender et al. differs from the instant claims in that the reference does not explicitly teach whether the masking molecules are formed on the previously coated electrodes.

However, Tender et al. recognizes that "[c]ontamination of monolayers previously formed on other elements may occur by displacement of monolayer constituents by alkanethiols in solution. Such cross-contamination may be minimized, however, by using low concentrations of alkanethiols and/or using short immersion times and/or using analogous disulfides." (See footnote 25, page 5517, left column). Furthermore, Tender et al. explains that EG6S SAMs function to resist biomolecule adsorption (i.e., to mask biomolecule adsorption), whereas C16 SAMs function to promote biomolecule adsorption (page 5517, left column, second full paragraph).

Since Tender et al. recognizes that contamination of monolayers may occur on previously coated electrodes and that certain molecules function as a mask for adsorption, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have exposed the electrodes to a masking molecule, because it would minimize the displacement of monolayer constituents by the different alkanethiols in the solution, as suggested by Tender et al. (Page 5517, right column, second full paragraph). Furthermore, since Tender et al. recognizes that the alkanethiol may displace previously formed monolayers (i.e., previously coated electrodes; see footnote 25 on page 5517), it would have been obvious to one having ordinary skill in the art to recognize that the alkanethiol (i.e., masking molecule) would form on the previously coated electrodes via displacement, as suggested by Tender et al. While

Tender et al. teaches that it is desirable to minimize the effect, Tender et al. recognizes that alkanethiol can formed on previously coated electrodes. Therefore, the mere recognition of latent properties in the prior art does not render nonobvious an otherwise known invention (MPEP 2145); the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Regarding claim 2, Tender et al. teaches that the array can comprise n individually-addressable microelectrodes, which suggests that any number of addressable electrodes can be used. Selecting the number of individually addressable electrodes to suit the desired application would have been obvious to one having ordinary skill in the art.

Regarding claim 3, Tender et al. teaches that the extension of this technique to patterning more than two different monolayers (say n) should be straightforward. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have repeated the process multiple times in order to form a coating of more than two different monolayers, as suggested by Tender et al. (Page 5517, right column, second full paragraph).

Regarding claim 4, Tender et al. teaches that the electrode dimension is not more than 50 μm (see Fig. 2).

Regarding claim 5, Tender et al. teaches that the separation between the electrodes is not more than 30 μm (see Fig. 2).

Regarding claim 6, Tender et al. teaches that the electrodes are metal electrodes (i.e., gold, page 5516, right column, first full paragraph), and that the masking and coating molecules are thiolated (i.e., EG6SH and C16SH).

Regarding claim 10, Tender et al. teaches that the coating molecules are polypeptides (i.e., antibody or protein, page 5517, right column, first full paragraph) modified with a function of group capable of adsorbing onto the electrodes

Regarding claim 12, since Tender et al. teaches that the technique can be extended to patterning more than two different monolayers with an array of n individually-addressable electrodes, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have controlled the potential of electrodes from which desorption is not required, because it would prevent the previously formed coating on the electrodes from being desorbed. Since the electrodes are individually addressable, they can be individually controlled.

Regarding claim 13, the application of the voltage by Tender et al. is either AC or DC, since an electrical potential can only be applied by either AC and DC.

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tender et al. in view of Barton et al. (WO 99/51778).

Tender et al. teaches the method as described above. Tender et al. differs from the instant claims in that the reference does not explicitly teach the specific coating molecules of the instant claims.

Barton et al. teaches a highly sensitive and accurate method for the detection of genetic point mutations in nucleic acid sequences and its application as a biosensor. In particular, the invention relates to electrodes that are prepared by modifying their surfaces with oligonucleotide duplexes combined with an intercalative, redox-active species and their use as sensors based on an electrochemical process in which electrons are transferred between the electrode and the redox-active species (page 8, lines 25-31).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have deposited the oligonucleotides of Barton et al. in the method of Tender et al., because it would enable the electrodes to function as a biosensor for the detection of genetic mutations in the nucleic acid sequences (page 8, lines 25-31 of Barton et al.).

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tender et al. in view of Chan (US patent 6355420).

Tender et al. teaches the method as described above. Tender et al. differs from the instant claims in that the reference does not explicitly teach applying an electric field.

Chan teaches that the orientation of DNA in an electric field has been well studied (column 84 lines 40-43), and that DNA molecules and other polymers align themselves in the direction of electric fields whether in an electrophoretic gel or in solution (column 85 lines 19-23). The implications of DNA alignment in an electric field

further support the fact that DNA molecules and other polymers can be driven across nanochannels in a linear fashion (column 85 lines 23-26).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have applied an electric field, as taught by Chan, in the method of Tender et al., because it would align the coating molecules, such as DNA molecules or other polymers, in the direction of the electric field (column 85 lines 19-23 of Chan). The application of the electric field is either AC or DC, since an electrical potential for providing the electric field can only be applied by either AC or DC.

Response to Arguments

Applicant's arguments filed on April 6, 2010 have been fully considered but they are not persuasive. In the arguments presented on page 7-8 of the amendment, the applicant argues that Tender et al. does not contemplate a reprotection step and that it is not clear that C16S or EG6S are capable of acting as a mask for previously coated electrodes. The applicant further argues that Tender et al. Teaches minimization of electrode contamination using low concentrations of alkanethiols, short immersion times, or analogous disulfides, which is in contrast to the present invention by reducing the contamination by using a reproduction step. This argument is deemed to be unpersuasive, because of the following reasons:

First, Tender et al. recognizes that the alkanethiol may displace previously formed monolayers (i.e., on previously coated electrodes; see footnote 25 on page 5517). Therefore, the process of displacing the previously formed monolayers (i.e.,

previously coded electrodes) results in the alkanethiol forming on the previously coated electrodes. While Tender et al. teaches that it is desirable to minimize this effect by using low concentrations of alkanethiols, etc., the mere fact that Tender et al. recognizes that alkanethiol can displace previously formed monolayers means that the alkanethiol is forming on the previously coated electrodes. Even when this process is **minimized**, as suggested by Tender et al., one having ordinary skill in the art would expect that this process would still occur since the "contamination" cannot be completely eliminated. Therefore, the mere recognition of latent properties in the prior art does not render nonobvious an otherwise known invention (MPEP 2145); the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Second, claim 1 broadly recites "coating molecule" and "masking molecule" and that these molecules are thiolated (dependent claim 6). Since Tender et al. uses the same types of molecules, i.e., thiolated molecules, for depositing the coating molecule and masking molecule, one having ordinary skill in the art would expect that the masking molecule of Tender et al. would inherently form on the previously coated electrodes since Tender et al. uses the same molecules. If this is not inherent, then the limitation must be a result of limitation(s) not presently claimed.

Finally, since the claim broadly recites "masking molecule" which is open to any molecule and Tender et al. teaches exposing the electrodes to n different alkanethiols to

form an array consisting of n elements modified with n different alkanethiolates, one having ordinary skill in the art would expect that one of these alkanethiols would function as a masking molecule that would be capable of adsorbing onto all electrodes. Since the molecules of Tender et al. are the same as those of the invention, one having ordinary skill in the art would have a reasonable expectation that the molecules of Tender et al. would form on all the electrodes, including previously coated electrodes.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LUAN V. VAN whose telephone number is (571)272-8521. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/LUAN V VAN/
Examiner, Art Unit 1795
April 23, 2010